



EH&S Fact Sheet and Checklist

RODENT

Waste Anesthetic Gas (WAG)

What is waste anesthetic gas (WAG)?	WAG most often refers to occupational exposure to anesthetic gas (e.g., isoflurane , desflurane, and sevoflurane) during a medical or surgical procedure.
What contributes to WAG exposure?	Leakage from tubing, seals, and gaskets; poor work practices/lack of training; poor ventilation; and ineffective gas-scavenging systems.

Health Effects of WAG Exposure

What are the health effects of being exposed to WAGs?	Acute effects — dizziness, lightheadedness, nausea, fatigue, headache, irritability, depression. Chronic effects — liver and kidney disease, birth defects, miscarriages — Visit the MGH Occupational Health website or NIOSH for more information.
What are the Exposure Limits?	NIOSH has a non-regulatory recommended exposure limit (REL) for halogenated agents (e.g., isoflurane) of 2 ppm as a ceiling limit (over a sampling period not to exceed one hour) during anesthetic administration. OSHA has not established a regulatory permissible exposure limit (PEL) for anesthetic gases; therefore, 2ppm is used as the exposure threshold.

Exposure Risks

What activities have been found to have an increased risk of exposure to WAGs?	<ul style="list-style-type: none"> Not ensuring a tight seal around the animal's nose cone. Failing to flush the induction chamber with oxygen prior to opening the chamber to transfer animals. Improper scavenging Prolonged or multiple surgeries/procedures with passive scavenging and/or inadequate ventilation.
Is exposure monitoring available?	Upon request, EHS will evaluate staff exposures by monitoring laboratory workers while they perform work with WAGs.

Personal Protective Equipment (PPE)

What are the minimum PPE requirements while filling the vaporizer?	<ul style="list-style-type: none"> Nitrile gloves Lab coat Eye protection (safety glasses, goggles or a face-shield) <p>NOTE: Species-specific and biosafety level PPE requirements must also be followed</p>
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Scavenging Requirements

Do you need to scavenge/capture WAGs?	<ul style="list-style-type: none"> WAGs MUST be scavenged through active or passive means. Active scavenging involves an active airflow system that draws WAG away from the researcher into an in-house vacuum exhaust line or chemical fume hood. Passive scavenging involves passing the WAG through an activated charcoal canister, after which the air is discharged into the room. <p>NOTE: If scavenging systems are not properly used or maintained, gases may escape into the work area resulting in overexposures.</p>
What are the most effective means for scavenging WAGs?	First Choice: Use of a downdraft surgery table OR commercially available active scavenging system* OR placement of the entire gas mixing and delivery system within a ducted fume hood
	Second Choice: Use of an in-house vacuum exhaust line and regulator
	Third Choice: Capture of waste gas using gas scavenging canisters. The work must be done in a well-ventilated area with no recirculation of room exhaust. Scavenging canisters are appropriate under the following conditions: <ul style="list-style-type: none"> No fume hood or other local, hazardous exhaust system is available for use. Leak checks are performed routinely on equipment. Saturation levels (weight) of canisters are checked and documented prior to each use. Researchers are trained and supervised in proper use and maintenance of the anesthetic delivery and scavenging equipment.

*Contact EH&S (617-726-2425) for guidance

Anesthetic Equipment Maintenance

- Anesthesia machines and vaporizers must be maintained and certified annually unless otherwise specified by the manufacturer.
- Inspect the induction chamber seal and replace as necessary.
- Establish written procedures for daily and routine inspection/maintenance of anesthesia and scavenging systems.

Checklist for Working with Anesthetic Gas

- Ensure personnel receive training on equipment use. Managers should document the training.
- Review and understand the manufacturer's instructions for operating the equipment.
- Use a certified local exhaust ventilation system (chemical fume hood, downdraft table etc.) as the preferred means to remove WAGs.
- Verify equipment (e.g., fume hood and vaporizer) is currently certified and in working condition.
- Ensure connections are properly secured.
- Verify preventative maintenance has been performed annually or more frequently per the manufacturer.
- Check equipment for leaks by pressure testing before each use. If a leak is suspected contact EH&S (6-2425). If you are using a CCM-owned anesthesia machine, also contact Veterinary Services or the on-call vet (617-721-9332).
- Fill vaporizer with the specific anesthetic for which it is certified either in a fume hood or using an anti-spill bottle adaptor. Use chemical-resistant gloves, lab coat, and eye protection.
- Keep laboratory doors closed when anesthetic gas is in use.
- Avoid high concentrations of isoflurane (>4%) for induction and/or for prolonged periods. Turn off vaporizer when animals are not receiving anesthetic.
- Close induction chamber lid(s) during anesthetic gas delivery.
- Once the animal is anesthetized in the chamber, turn off isoflurane and flush the chamber per manufacturers recommendations.
- To open the chamber door, stand back as far as feasible and open away from worker. Sliding-top chambers are best.
- Minimize leakage from animal's nose cone by selecting the best-fitting commercially available size with a tight-fitting diaphragm.
- Keep worker's breathing zone as far as possible from animal's nose cone.

Charcoal Canisters

- Follow manufacturer recommendations.
- Weigh canister before and after each use. Discard canister when it has gained the weight (g) printed on the canister by the manufacturer or after 6 months, whichever comes first.
- Confirm that the canister is correctly connected to the breathing system.
- Use one canister for the face mask and another for the induction chamber.

Spills and Waste

- **Spills** — Do not attempt to clean up isoflurane spills. Evacuate personnel and allow anesthetic to evaporate. Call EH&S (617-726-2425) for guidance.
- **Waste** — Dispose of charcoal canisters into the regular trash. Empty bottles may be triple-rinsed, labels removed, and disposed of as non-hazardous glass waste.